

adorned a columbarium. The Roman archaeologists and artists believe that these paintings are of the Augustan age, and are of great value both to science and art. In making preparations for constructing the central hall in the Conservatory Palace at the Capitol, a ground-plan has been discovered supposed to be that of the Temple of the Capitoline Jupiter, to which Dionysius gave a surface of 4,000 square feet. In the same place has been found a column of large size, which appears to belong to the Temple of Jupiter Optimus Maximus. Excavations in other places have brought to light additional fragments of antiquarian interest.

THE Secretary of the Interior, in his annual report to the President of the United States, commends in high terms the work of the Geological and Geographical Survey of the Territories, and presents the following brief summary of the results for the season of 1875:—The survey under Dr. Hayden continued its labours of the two preceding years in the Territory of Colorado. The field of work during the past season was the southern and western portions of said Territory, and including a belt, fifteen miles in width, of the northern border of New Mexico and the eastern border of Utah. The survey was divided into seven parties, four of which were devoted to topographical and geological labours, one to primary triangulation, one to photographic work, and one to the transportation of supplies. The survey of the southern and south-western portions of Colorado has been completed, so as to make six sheets of physical atlas, designed by this Department, leaving unexplored only the north-western corner thereof, which can be surveyed by a single party during the coming year. The districts explored in the past season were not so mountainous as those of the previous years, but were quite remote from settlements, and in perhaps the most inaccessible regions of this continent. The total area surveyed is about 30,000 square miles, portions of which were very rugged. Much of this area is drained by the Colorado river, and is mainly a plateau country cut in every direction by deep gorges or canons, the sides of which show, for geological investigations, admirable sections of the strata forming the earth's crust. The topography of the district surveyed was elaborated in detail by the aid of the plane-table. The exploration of the remarkable prehistoric ruins of Southern Colorado, glimpses of which were obtained the preceding season, was continued with great success. They were traced down the canons to the Colorado river in New Mexico, Utah, and Arizona, and their connection established with the cliff cities of the Moquis of the latter Territory. Hundreds of cave-dwellings, of curious architecture and many miles from water, were found in the sides of the gorges, and the ruins of extensive towns discovered in the adjacent plains, indicating the former existence of a people far more numerous and advanced in the arts of civilization than their supposed descendants of the present day. Of these ruins many interesting sketches, plans, and photographs were made, and a valuable collection of flint weapons, earthenware and other specimens, was gathered. The materials thus obtained will enable the survey to present an exhaustive report on this interesting subject. The photographer of the survey obtained a series of mountain views on plates twenty-four inches long by twenty wide, or larger by several inches than any landscape photographs ever before taken in this country.

A FRENCH clerical journal, quoted by the *Revue Scientifique*, maintains that the tolling of the church bell is of much greater efficacy than the use of lightning-rods in warding off the effects of a thunder-storm, and advises the faithful to resort to the former means in preference to the latter.

THE *Revue Scientifique* announces the death, at Zurich, of the chemist Prof. E. Kopp, "one of the creators of the atomic theory."

THE Institution of Naval Architects has issued a list of subjects on which communications are desired.

THE American Institute of Mining Engineers held a meeting at Cleveland, Ohio, October 26–28. Its proximity to several of the large iron and steel works and the interest taken by its President, Prof. A. L. Holley, in the details of the Bessemer process, caused the meeting to be more especially devoted to that class of subjects. Prof. Holley in his opening address referred to several improvements which ought to be made in the iron and steel manufactures. Among the papers of scientific interest relating to mining subjects was a mention by Mr. Charles A. Ashburner of the discovery of coal-beds in the Vespertine sandstone of Pennsylvania. Mr. Ashburner is one of the assistant geologists of the Second Geological Survey of Pennsylvania. There have been a few scattered instances of discoveries of coal in the Vespertine rocks, and such beds have been designated as false coal-measures. The present discovery may, however, serve to modify our notions as to that sub-carboniferous formation. In a tunnel passing through Sideling Hill, Huntingdon County, Penn., in cutting the Vespertine sandstones, there were found not less than nineteen beds of coal; their thickness varies from one to thirteen inches; collectively they would make a thickness of four feet. The coarseness and false bedding of the Vespertine strata indicate a period of frequent agitation and numerous local currents; but the presence of coal-beds shows that considerable spaces of repose must have intervened, and that the changes were slowly effected.

AT the meeting of the Norfolk and Norwich Naturalists' Society, on Nov. 30, the Secretary read a short paper from Dr. Lowe on the occurrence of a rare microscopic fresh-water Alga (*Clathrocystis aruginosa*, Hen.) at Anmer, near Lynn. In June 1870 Dr. Lowe discovered a large quantity of it in the lake at Sandringham in the form of a green scum. In October of the present year he again discovered it growing in a pond at Anmer, two miles from Sandringham, his attention being attracted by the peculiar scum which he at once recognised as *Clathrocystis*. It seems probable that it has recently been introduced at Anmer by the agency of wild fowl.

THE additions to the Zoological Society's Gardens during the past week include a Haste's Apteryx (*Apteryx hastei*) from New Zealand, presented by Baron Ferdinand von Muller; a Marginated Parrakeet (*Tanygnathus marginatus*) from the Philippine Isles, presented by Master Hugh Sutton; two Bengal Leopard Cats (*Felis bengalensis*) from Cashmere, presented by Mr. W. A. Cuthell; a Bay Antelope (*Cephalophus dorsalis*) from W. Africa, received in exchange; an Ocelot (*Felis pardalis*) from S. America, a Hoffmann's Sloth (*Choloepus hoffmanni*) from Panama, a Duck Falcon (*Falco anatum*) captured at sea, purchased; a pair of Peacock Pheasants (*Polypectron chinquis*) from Burmah, deposited.

### SCIENTIFIC SERIALS

*Jahrbücher für wissenschaftliche Botanik*. Herausgegeben von Dr. N. Pringsheim. Band x. Heft 11.—In the present number of Pringsheim's well-known and valuable year-books there are four papers, all of them of considerable interest. The first is by Dr. J. Reinke, of Göttingen—Contributions to the anatomy of the secreting organs, occurring especially on the serrations of certain foliage-leaves. It has been observed that in many plants the serrations of the leaves act as glands and secrete in many instances a mucilaginous substance, and in others resin, or a mixture of mucilage and resin, called blastocolla by Hanstein. Reinke has carefully examined the structure of these secreting organs in a large number of dicotyledonous plants, but has not made any exhaustive micro-chemical investigation of the secretions themselves. His observations show that the serrations of the leaves of Dicotyledons are in general the bearers of peculiar organs of secretion, whose activity may cease even while the leaf is in the bud, or at a later period. *Æsculus* and plants with

spiny leaves apparently have no such secreting organs. In respect to the secretion itself, it is in the bud either a fluid mucilage or resin, while in the full-grown leaf it is only a watery or somewhat mucilaginous fluid. The paper is illustrated by two plates, on which are figured the glands of *Prunus avium*, *Kerria japonica*, *Vicia faba*, *Betula alba*, *Corylus avellana*, *Evonymus japonicus*, *Ribes multiflorum*, *Epilobium Dodonæi*, *Catalpa syriaca*, *Clerodendron fragrans*, and *Viola odorata*.—The second paper, on the process of fertilisation in the Basidiomycetes, is by Dr. Max Reess. Every day renders it more and more probable that the receptacles, or fruit-bearers, of the Basidiomycetes are, like the sporocarps of the Ascomycetes, the result of the fertilisation of a carpogonium. The researches of Reess now under consideration, those of Van Tieghem, and lastly, those of Dr. Eduard Eidam, in the *Botanische Zeitung*, 1875, p. 649, all tend in the one direction, and lead us to look with very great caution on the results obtained recently by Mr. Worthington Smith, and published in the *Gardener's Chronicle* for October. Reess has examined the early stages of *Coprinus stercorarius*, Bulliard, which develops rapidly, and could be easily obtained. The ripe spores of *Coprinus stercorarius* are ellipsoidal in shape, pointed towards each pole, and average eleven mic. mill. long by six mic. mill. broad, having a brown epispore. Germination begins by the protrusion of the endosporium in the form of a colourless papilla at one, rarely at both, the poles of the cell. The process is a rapid one, and at the ordinary temperature of a room occurs in from four to five hours after sowing. The mycelia rapidly develops and branches frequently, so that in three or four days the mycelia from a single spore will form a patch from  $1\frac{1}{2}$  to 2 mill. in circumference. At first the mycelium is formed of a single much-branched cell filled with colourless homogeneous protoplasm, numerous vacuoles forming in the older parts as branching proceeds. At the end of the second day numerous transverse walls appear in the mycelium, and a little later the hyphæ are seen to anastomose. In from three to four days after the germination of the spores, special bearers of minute rod-like cells appear. They are more or less long cylindrical cells with protoplasm, and they bear at their ends, or sometimes at the side, the short, straight rod-like cells. These grow until they have attained a certain length, then they divide, and the upper one drops off, a process which may be repeated two or three times, so that at about the end of two days, when the entire protoplasm of the bearers has disappeared, the process stops, and then the bearers themselves may fall off. When this occurs a little pile of about fifty to sixty rod-like cells may be noticed. These rod-like cells might be confounded with conidia, but further observation has shown that they cannot germinate, and there is now no doubt whatever that they are *spermatia*, and therefore male cells. The youngest stage of the fruit-bearer is a thick, more or less irregularly-shaped hypha thread, densely filled with protoplasm, and resembling the earliest stage of the carpogonium of *Ascobolus*. The next stage is the fertilisation by means of the *spermatia* which attach themselves to the branching sacklike structure, and as the *spermatia* at once lose their contents, the empty wall contrasts strongly with the protoplasm of the carpogonium. After fertilisation the carpogonium becomes more and more tortuous and branched. The *spermatia* of *Coprinus* are therefore male cells; their bearer the antheridium, while their function is the fertilisation of the carpogonium. As a consequence of fertilisation the carpogonium develops into the fruit-bearer of the fungus. The process described by Reess will thus be seen to have a very close resemblance to the fertilisation of the Floridæ, such as *Nemalion* and *Batrachospermum*.—The third paper is on the "Germination of the spores of *Cyathus striatus*, Willd., one of the Gasteromycetes," by Dr. R. Hesse, with one plate. The spores germinate by the protrusion of the endosporium at one, rarely at both, poles, a single hypha thread three or four times the length of the spore being formed. Transverse walls then appear, and the free end of the thread separates into a number of small cells, but the further history of these minute cells has not been studied.—The fourth and last paper in this number is "On the development of certain flowers with especial reference to the theory of Interposition," by Dr. A. B. Frank, with three plates. The author gives the results of his researches on plants belonging to the natural orders Papilionaceæ, Geraniaceæ and Oxalidaceæ, Malvaceæ, and Primulaceæ. Many important observations are made in reference to the order of succession of the parts of the flowers, the development of diplostemonous flowers, and of flowers with superposed stamens. The paper is however not one that can be usefully abstracted. Altogether this number of

Pringsheim's *Jahrbuch* maintains its well-known high standard of excellence, and is well illustrated.

THE first part of the twenty-fifth volume of Von Siebold and Kolliker's *Zeitschrift für Wissenschaftliche Zoologie* (Nov. 1874) contains an article of 100 pages by E. Ehlers, of Erlangen, on the vertical distribution of the marine chætophorous annelids, based on the specimens secured in the *Porcupine Expedition*. In the same article is included M. Claparède's report on the chætophorous annelids brought home by the *Lightning*. The forms are carefully described, new species are added, and the results are excellently tabulated. It is concluded that all the families of polychætophorous annelids which are known as littoral inhabitants on the Atlantic coasts of Europe, excepting the Telethuseæ and Hermellidæ, are represented in the deep-sea fauna; that beyond the littoral region a greater or less depth does not influence the character of the annelid fauna; that temperature influences it just in the same manner as temperature influences the littoral annelids. Four very excellent plates, chiefly of annelid appendages, are given.—Karl Möbius gives a detailed account of the anatomy of the Rotifer *Brachionus plicatilis*.—Dr. F. C. Noll describes *Kochlorine hamata*, a new genus and species of boring Cirripede, boring into Haliotis and other shells, differing from *Cryptophialus* and *Alcippe* in lying free in the artificial cavity in the shell, and in other important particulars.—The second part (March 1875) opens with a contribution by W. Repiachoff to the embryology of *Tendra zostericola*.—Prof. Ranke describes minutely the supposed organs of hearing in *Acridium carulescens* and the eyes of the leech.—Dr. Claus describes the shell-glands of *Daphnia*, identifying them with the segmental organs of annelids, and with the kidneys of vertebrates.—Dr. H. Dewitz writes on the structure and development of the sting and the ovipositor in several common Hymenoptera and the Grasshopper, which he calls *Locusta viridissima*, instead of using the generic name *Gryllus*.—O. Bütschli contributes some "preliminary observations" on the first steps of development in Nematodes and Snails.—Dr. von Willemoes-Suhm's third letter from the *Challenger* concludes the number.—The third part (May 1875) contains as its *pièce de résistance* a very valuable memoir, by Dr. C. Claus, on the development, organisation, and systematic position of the Argulidæ. *Argulus foliaceus* is the species chiefly described, both in its development and adult state. Dr. Claus concludes that it is useless to describe a distinct species of *Argulus* for every fish on which it is parasitic. It is established that *Argulus foliaceus* is parasitic on a great variety of fishes, also on toads and tadpoles, and even on the Axolotl. It appears that *Argulus* reproduces itself not only in early spring but also in summer and autumn with great freedom. For many reasons Dr. Claus places the Argulidæ among the Copepoda, and constitutes them a sub-order under the name Branchiura.—Dr. L. Stieda describes the structure of the central nervous system of Axolotl; the brain he asserts to be of a more completely embryonic type than any whose structure has been carefully examined.—E. Metschnikoff describes the early development of Geophilus. He finds that its larva differs from those of Chilognathous Myriopods in having its yolk-mass inside instead of outside the alimentary canal.—Oscar Grimm gives an account of the results of his dredgings in the Caspian Sea last year, resulting in the discovery of eighty new species.

*Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie* Nov. 1.—Dr. Hann contributes an article on the meteorology of the Punjab, founded on the reports made by Mr. Neil for 1871, and by Mr. Calthrop for 1872.—Prof. Buys Ballot gives a table showing the tension of aqueous vapour at eighteen places in Russia for each month. It appears that at all stations the tension is below the average from November to April, and above it from May to September, and at some places in October. The influence of height, latitude, longitude, and proximity of the sea is plainly indicated by the table.

*Journal de Physique*, October.—In this number M. Penaud describes some researches on aviation, and apparatus for mechanical flight, for which a prize was recently awarded him by the Paris Academy.—Some experiments by M. Moreau are given as showing that a fish with swimming bladder undergoes variations of interior pressure, and that it adapts itself to different heights not by a mechanical action exercised on the bladder by means of its muscles, but by changing the quantity of air contained in the organ.—The penetration of electricity into badly-conducting substances has been sufficiently demonstrated, but there is still a good deal of confusion as to the mode of its action. M. Neyreneuf here endeavours to give precision to ideas



on the subject. He finds, *inter alia*, that in the case of a compound insulating plate between two armatures, the electrification of the two extreme plates is the same as that of a single plate (*i.e.* positive on the side of the positive armature, negative on the side of the negative), and the *persistent* electrification of the intermediate plates is also the same; but at the moment of separation these plates may appear positive and negative on both their faces.—M. Righi contributes a mathematical note on the laws of electromotive forces, and there is the usual amount of matter abstracted from other serials.

## SOCIETIES AND ACADEMIES

### LONDON

Royal Society, Dec. 9.—On the Development and *Lepas fascicularis* and the "Archizoëa" of Cirripedia, by the late R. von Willemoes-Suhm, Ph.D. The author shows that the *Archizoëa gigas* of Dohrn is the nauplius of *Lepas australis*, a form closely allied to *L. fascicularis*. The life history of the latter is described.

Preliminary remarks on the Development of some Pelagic Decapoda, by the late R. von Willemoes-Suhm, Ph.D. The genera described are *Amphion*, *Sergestes*, and *Leucifer*. The first passes through a true Zoëa stage, *Amphion* itself being, as Dohrn has shown, adult. The larvæ of *Leucifer* and *Sergestes* pass through an *Amphion* stage. The form *Elaphocaris* of Dohrn is proved to be the larva of a *Sergestes*. The form *Erichthina* of Dana is proved to be the larva of a *Leucifer*.

Dec. 16.—On the Structure and Development of the Skull in the Batrachia, by W. K. Parker, F.R.S. The author makes some corrections in his memoir on the skull of the frog, specially showing that the hyoid arch does not coalesce with the mandibular. The skull of *Dactylethra* and *Pipa* are described. The indications of vertebral segmentation in the cephalic part of the notochord are demonstrated in a manner which has much theoretical interest in relation with the theory of Goethe and Oken.

On the development of the spinal nerves in Selachians, by F. M. Balfour, B.A. The author shows that both the roots of the spinal nerves arise as outgrowths from the involuted epiblast of the neural canal, the posterior first, and by the more complicated process.

Chemical Society, Dec. 16.—Prof. Abel, F.R.S., president, in the chair.—Dr. C. R. A. Wright read a paper by himself and Mr. G. H. Beckett, on narcotine, cotarnine, and hydrocotarnine (Part iii.), in which the authors brought forward experimental evidence of the constitutional formula for hemipinic acid, opianic acid, and meconin.—Dr. H. E. Armstrong then gave an account of researches by Mr. Harrow and himself, on the action of alkaline sulphites on the haloid derivatives of phenol, and on the action of nitric acid on tribromophenol.—Mr. E. Neison subsequently made a communication on the sebatates of the alcohol series, after which papers were read by the Secretary, on the compounds of ether with anhydrous metallic chlorides, by Mr. P. P. Bedem, and observations on variations in the composition of river waters, by Mr. J. Andrews.

Royal Astronomical Society, Dec. 11, 1875.—Prof. Adams President in the Chair.—Mr. Burton read a paper on the Southern nebule 30 (Bode) Doradus and the nebule about  $\eta$  Argus. Mr. Burton had while stationed at Rodriguez on the Transit of Venus Expedition made drawings of these rebule with a 12½ inch silver on glass reflector, and on his return had compared them with Sir John Herschel's drawings. After a careful comparison he was not disposed to think that there had been any great change in either of the nebule since the date of Sir John Herschel's observations.—Mr. Ellery, of the Melbourne Observatory, described the observations which they had made of the same nebule with their great Melbourne 4-feet reflector. He was inclined to think that rapid change could be traced not only in the details of the nebule but also in the relative positions and magnitudes of the stars which appeared to be involved in them.—Mr. Ellery also read a paper on the results of some experiments with Huygen's parabolic pendulum for obtaining uniform rotation. The instrument he had used consisted of a heavy weight or bob attached by a thin flexible band of watch-spring steel to the upper part of a piece of metal cut into the form of the evolute of a parabola. This was attached to the upper part of a revolving axis so that the contrivance formed a conical pendulum, in which when the rate of motion was increased the bob or pendulum flew away from the axis and wound the watch-

spring band round the evolute of the parabola. He found that with this contrivance a very uniform rate of motion was obtained, and it seemed to be independent of the weight which was placed on the bob of the pendulum and of variations in the driving power used.—A paper by Mr. With on the structure of Coggia's Comet was read. On the night of the 8th July, 1874, an oscillatory motion of the fan-shaped jet in front of the nucleus was observed. The fan seemed to tilt over from the preceding towards the following side and then for an instant appeared sharply defined, then it became nebulous and all appearance of structure vanished. These pulsations and appearances of structure occurred several times at intervals of from three to eight seconds.—Mr. Ranyard read a paper on the duplicate structure of Coggia's Comet. He showed two drawings each made on July 14, 1874, the one by Mrs. Newall with the great refractor at Gateshead, and the other by Mr. With at Hereford. Both drawings showed that on that evening there were two faint parabolic arcs, which intersected one another in front of the nucleus. The axes of the arcs were parallel to one another, and were separated by a distance of about 1". During the earlier evenings of July the parabolic arcs within the envelope of the comet had been drawn by several observers as double and overlapping, but the axes of the two sets of parabolic arcs were much less separated than those of the arcs visible on the evening of the 14th. Mr. Ranyard suggested that possibly a disruption was going on similar in character to the disruption which took place in Biela's comet as it approached perihelion in 1846.—Father Perry showed some photographs of the transit of Venus which had been sent to him from Manila. They appeared to show the body of Venus projected on a bright back-ground outside the sun's limb. It was suggested, however, from other evidence, that the photographs must have been taken from drawings. Lord Lindsay and Mr. Brothers, after an examination of the photographs, both inclined to the latter view.

Meteorological Society, Dec. 15.—Dr. R. J. Mann, president, in the chair.—William Ellis, F.R.A.S., Kaufmann J. Marks, Thomas Read, and Philip Wright, F.C.S., were elected Fellows of the Society. The following papers were read :—On the registration of sunshine, by R. H. Scott, F.R.S. This paper is on the continuous record of sunshine and rainfall obtained at Kew for September 1875; the latter by Beckley's rain-gauge, the former by a method originally proposed by Mr. J. F. Campbell, of Islay, F.G.S. This consists in the use of a sphere of glass to concentrate the sun's rays, and a strip of cardboard is placed on a frame concentric with the sphere and distant from it by its own focal length. The sun when it shines burns a hole in the cardboard, the length of the trace being regulated by the duration of the sunshine. It remains to be proved whether such a record is of real practical value, as it affords no measure of the heat of the sun.—On the rainfall at Calcutta, by R. Strachan. These observations were made at the Office of the Surveyor-General, and extend over a period of twenty-eight years, viz., from 1847 to 1874. The most rain falls in July, but the heaviest downfalls are most frequent in June, and heavy downfalls are more frequent in August than in July. The greatest number of days of rain is in July, but the number is almost the same for August. December has the least frequency and amount of rain. The dry season includes November to April, during which on an average 6'04 inches of rain fall, on 12 days out of 181, or 1 out of 15 days. The wet season is from May to October inclusive, during which 61'60 inches of rain fall, on 84 days out of 184, or about 1 in 2 days. There is therefore ten times as much rain in the wet season as in the dry, and nearly seven times as many rainy days. The mean annual rainfall is 67'64 inches on 96 days.—On the use of the rotatory thermometer (*Thermomètre fronde*) on board ship, by R. H. Scott, F.R.S. This paper showed that the mean of 76 days' observations made by Capt. Heggum, of the *Roselle*, on a voyage from Liverpool to Calcutta only differed by  $-0\cdot4$  from the mean of the observations made in the ordinary way.—On the moon's influence in connection with our extremes of temperature, by George D. Brumham.—Mr. Scott exhibited a complete set of instruments, with thermometer screen, &c., as used at the Russian meteorological stations.

Anthropological Institute, Dec. 14.—Col. A. Lane-Fox, president, in the chair.—Mr. M. J. Walhouse read a paper on the belief in Bhutas—devil and ghost—worship in Western India. Although the lower castes and classes in India acknowledge and reverence the Brahminical gods, their familiar household cultus is much more especially addressed to inferior super-